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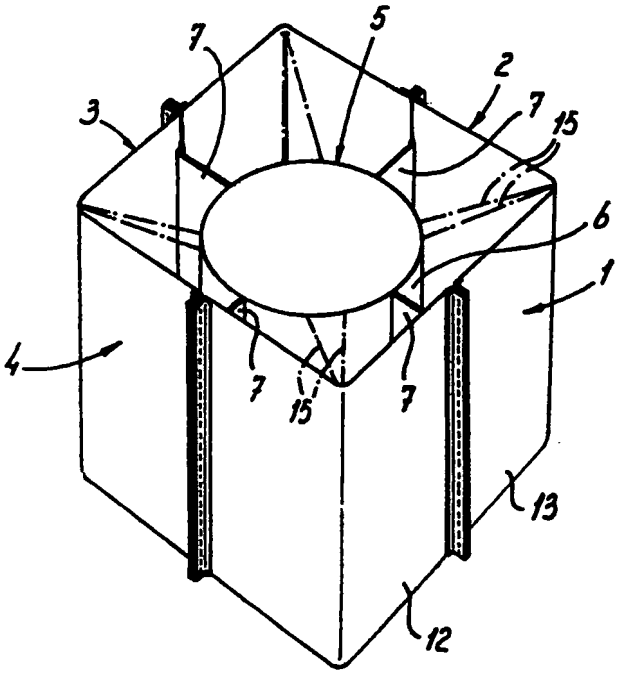
(54) Title: BLOCK-SHAPED CONTAINER FOR BULK MATERIAL

(57) Abstract

A block-shaped container (1) for bulk material, which container (1) is made of flexible material and has stabilisation means (5) for preventing its sidewalls (12, 13) from bulging out under the influence of the bulk material. These stabilisation means (5) are provided in the form of strips of flexible material (7) which are fixed at one side to a sidewall of the container (12, 13) and at the other side to a thin-walled core (16) with a cross section which is closed in a plane at right angles to the sidewalls (12, 13). The core (6) is preferably a ring or pipe of flexible material, on the outside of which the strips (7) of flexible material run. The filling opening is situated directly above the core (6), in such a way that when the container (1) is being filled the bulk material initially collects in the core (6) and said bulk material presses the flexible material of the core (6) radially outwards and pulls it taut to a cylindrical shape. The stable core (6) thus formed, by way of the flexible strips (7), prevents the container walls from bulging out.



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Block-shaped container for bulk material

The invention relates to a block-shaped container for bulk material, which container is made of flexible material and has on the inside stabilisation means fixed to the side walls, for preventing its side walls from bulging out under the influence of the bulk material, and also a filling opening situated on its top side.

Such a container is known from European Patent Application EP-A-247696. It is suitable for all kinds of bulk material, while the block shape of the container is to ensure that it takes up relatively little space. If the block shape can be retained, such containers can be placed against each other in such a way that little transport space is lost. Containers made of supple material which lose their block shape cannot be placed against each other in such a way that optimum use of the transport space is obtained. If, for example, they deform to a cylindrical shape, gaps which cannot be put to any good use remain between the adjacent containers.

In order to ensure that the container has a block shape also when filled, the stabilisation means are provided on its side walls. However, despite these stabilisation means, this known container still has the tendency to assume a cylindrical shape when it is filled completely with the bulk material. The stabilisation means used here provide only a limited solution. Besides, the production costs of this known container can increase considerably if the stabilisation means are fixed on eight different seams over the height of the side walls.

The object of the invention is therefore to provide a container of the above-mentioned type which does not have these disadvantages. This is achieved through the fact that the stabilisation means contain strips of flexible material which are fixed at one side to a side wall and at the other side to a thin-walled core with a cross-section which is closed in a plane at right angles to the side walls. The core can be a ring or pipe of flexible material, on the outside of which the strips of flexible material run. The whole container, including the stabilisation means, can thus be folded up to a small packet, so that transportation to the filling place is facilitated.

The stabilisation means according to the invention support the side walls, preferably halfway between the vertical edges of the side walls. In this way it can be ensured that the bulging out of said side walls remains limited.

Through the strips of flexible material and the thin-walled core, the interior space of the container is divided into five parts. In order to ensure that bridging cannot occur in any of these parts during filling or emptying of the container, these five regions have approximately the same surfaces. Each of the surfaces then has a measurement which is large enough to avoid bridging in the bulk material.

In this respect a further improvement can be obtained if the strips and the core are of equal length in the vertical direction and do not extend to the top edge and the bottom edge of the side walls. The five regions into which the inside of the container is divided are thus connected, in such a way that the container can be filled and also emptied completely through one filling and emptying opening.

During filling of the container the best results are obtained if the filling opening is situated directly above the core, in such a way that the bulk material initially collects in the core, said bulk material pressing the flexible material of the core radially outwards and pulling it taut to a cylindrical shape. As soon as the core is filled, it forms a stable cylinder, under the influence of the radially outward directed pressure force of the bulk material. The material put in then runs over the edge of the core into the areas lying outside and bounded by the strips of flexible material.

The bulk material in the process come into contact with the walls of the container and, through the fact that the horizontal measurement of the strips is approximately the same as the distance of the cylindrical wall filled with the bulk material from the side walls of the container, the block shape of the container can still be retained, despite the outward directed bulk material load exerted on the side walls.

Different working methods can be used for filling of the container. First of all, the container can be opened out by directing a jet of air onto the filling opening. The core of flexible material is also blown open here, in such a way that it is

ensured that the bulk material initially collects in said core.

According to another known method, the container is suspended by suspension lugs near its top corners. The container is thus opened out, but it is not yet ensured that the core is opened out in a suitable way to take the bulk material. In that case the side walls, near each top corner where the suspension lugs are provided, and the core are fixed to each other by means of pull tapes or cords, in such a way that when the container is suspended the core is held open by said pull tapes or cords. Here again, the bulk material will thus initially collect in the core during filling.

As regards the manufacturing of the container, it is advantageous if the side walls each comprise two halves connected to each other by a seam, in which seam a strip is also fixed. The halves of two adjacent side walls can also be integral. In this embodiment only four seams are present in the side walls, which constitutes a major advantage for the production of the container.

For containers which have to be dustproof, the seams can be made in such a way that the vertical edges of two wall halves belonging together in each case first run outwards, enclosing the vertical edge of the corresponding strip, then run folded away from each other through 180° back to the outside of the side wall and, finally, run folded away from each other through 90°, while a cord is sewn into the seam parts running outwards relative to the side wall. This special form of seam ensures that virtually no dust can escape from the inside of the container to the outside. Moreover, these seams can be produced simply with a standard sewing machine.

In a variant of the invention the container can also be made liquid-tight. This is achieved in a container in which a lining of liquid-tight material is provided, which lining has a slit or cut at the level of each strip, each strip projects outwards relative to the lining through the slit or cut, and the lining edges situated on either side of the strip in each case are fastened together in a liquid-tight manner by means of an adhesive tape which is essentially L-shaped.

In this case an L-shaped adhesive tape is in each case preferably fixed at one side to the outward projecting edge of the strip and at the other side to the outside of the lining edge in question. In order to reinforce the whole, a cord can in each case

be sewn into a packet comprising a first adhesive tape, a first side wall half, a strip, a second side wall half, and a second adhesive tape.

The invention also relates to a method for producing the stabilisation means for a container according to the invention. The strips and the core are in this case made of a self-contained length of flexible material, which length is formed into a square ring or tube, of which two walls are then folded inwards over the central generating line, in such a way that the two central generating lines concerned come to lie near each other, and a packet is obtained with the following lying on each other in succession: an unfolded side wall, two inward folded halves of an adjacent side wall and, finally, an unfolded side wall, following which the unfolded side walls are fastened each at a distance from their corner edge according to a generating line to the adjacent half of an inward folded side wall, in such a way that a strip is formed in each case between a corner edge and a fixing line, and the wall parts lying between the fixing lines form the core.

The invention will be explained in greater detail below with reference to an example of an embodiment shown in the figures.

Figure 1 shows a container in perspective, in which the top side is partially left out.

Figure 2 shows a side view of the container, in which a side wall is partially left out.

Figure 3 shows a detail of the seam of the container.

Figures 4a to 4d show the various stages of filling of the container.

Figure 5 shows a first phase of the production of the stabilisation means according to the invention.

Figure 6 shows a second phase.

Figure 7 shows the finished stabilisation means.

Figure 8 shows the side walls of the container for fixing together.

Figure 9 shows a cut-away view in perspective of a container with liquid-tight lining.

Figure 10 shows a detail of Figure 9.

The container shown in Figure 1 comprises side walls 1 to 4, and also interior stabilisation means 5. As can also be seen in Figure 2, these stabilisation means 5 have a core 6 of supple

material and four flexible edge strips 7. These edge strips 7 are fixed at one side to the core 6 and at the other side to one of the walls 1 to 4 in each case. The container is also provided with a top face 8 and a bottom face 9, each provided with a filling opening 10 and an emptying opening 11 respectively.

The supple strips 7 are fixed in the centre of the side walls 1 to 4, in the manner shown in Figure 3. As in Figure 1, it can be seen clearly here that the side walls, for example side wall 1, are made up of two halves 12, 13, which together with the supple strips 7 are sewn together. The adjacent edges of the wall halves 12, 13 are, as shown, bent away from each other through 180°, and then bent away in the opposite direction through 90°, in such a way that strips of material between which the flexible strips 7 can be sewn are obtained. Such a seam is highly dustproof. Owing to its ready accessibility, it can be easily made on a standard sewing machine.

As can also be seen clearly in Figure 1, the wall halves 12, 13 run through into the wall halves of the adjoining side wall, as a result of which a sturdy construction is obtained.

Fitted near the corners of the container are suspension lugs 14, by means of which the container can be suspended on a filling or unloading unit. Cords or tapes 15 which are fixed to the core 6 can also be provided near the corners. As soon as the container is opened out and suspended by its suspension lugs 14, the core 6 can also be opened out by means of the cords or tapes 15. Such cords or tapes 15 can be dispensed with if the container is opened out by means of a blowing device.

In Figures 4a to 4d the container is shown, partially cut away, during various stages of filling with a granular material. As shown in Figure 4a, the core is opened out, either by the blowing open of the container or by means of the cords or tapes 15, not shown here. A certain quantity of material initially collects on the bottom of the container, in such a way that the bottom edge of the core 6 is reached in the end. The core is then filled internally (see Fig. 4b). Following that, the situation shown in Figure 4c is reached, in which situation the core 6 is filled completely and the material goes into the space determined by the supple strips 7 and the core 6. Only now does the material come to rest against the outer walls 4 of the container but, since they can be retained by

the strips of supple material and the core 6 stabilised by the bulk material, they cannot bulge outwards. The container is shown completely filled in Figure 4d.

It will be clear that during emptying of the container the part of the container directly below the core 6 runs empty first, and then the adjoining spaces.

Figures 5 to 8 show different stages in the production of stabilisation means and the container walls. As shown in Figure 5, a self-contained length of supple material is first of all folded in such a way that a bottom wall 16, a top wall 17 and two folded walls 18, 19 are obtained. These walls are connected to each other by the fold edges 20 and 21. Figure 6 shows that the walls are then fixed to each other by means of the weld seams 22, as a result of which the four flexible edge strips 7 and the core 6 of supple material are obtained. Figure 7 shows all this again when opened out.

The side walls of the container are then assembled from strips of supple material each comprising a half 12, 13 of a side wall.

These halves are sewn together by edge strips 23, a supple strip 7 of the stabilisation means in each case being sewn securely between two adjoining wall strips (see also Figure 3).

As mentioned, the height of the edge strips 7 and the core 6 is less than the height of the wall halves 12, 13, in such a way that the stabilisation means do not run through to the top wall and bottom wall of the container then to be fitted. This top wall and this bottom wall are then also fastened together by means of the dustproof seams shown in Figure 3, the difference being that the supple strips 7 are left out.

In the container shown in Figure 9 a lining of liquid-tight material such as polyethylene, indicated in its entirety by 24, is fitted. The container has the side wall halves 12, 13 with edge strips 23, already described above. A top wall 25 and bottom wall 26 are also shown, also with edge strips 27.

The lining 24 has a slit 29 in each of its side walls 28. The outer edge 30 of a strip 7 projects through said slit in each case. Strips 7 and core 6 are not visible.

As can be seen in Figure 10, the edge 30 of each strip 7 is fixed by means of a double L-shaped adhesive tape 31 in a liquid-tight manner to the lining edges adjoining the slit 29. Finally, a

cord 36 is sewn through the packet comprising the strip 7 and lining 24 and adhesive tape 31, fixed to each other in this way in a liquid-tight manner, on the one hand, and the side wall halves 12, 13, on the other.

It is also pointed out that openings 32, 33 are provided in the top wall 26 and in the bottom wall 25, through which filling and emptying channels 34 and 35 respectively project when the container is assembled. These channels 34, 35 are joined together in the known way to shut off the lining.

In the embodiment shown, the adhesive tape 31 is double L-shaped and is folded around the edge 30 of strip 7. In that case cord 36 is also sewn through the adhesive tape halves 31.

According to a variant, two L-shaped, loose adhesive tapes can be used. The cord in this case need only be sewn through the side wall halves and the strip 7.

CLAIMS

1. Block-shaped container for bulk material, which container is made of a flexible material and has on the inside stabilisation means fixed to the side walls for preventing its side walls from bulging out under the influence of the bulk material, and also a filling opening situated on its top side, characterised in that the stabilisation means contain strips of flexible material which are fixed at one side to a side wall and at the other side to a thin-walled core with a cross-section which is closed in a plane at right angles to the side walls.

2. Container according to Claim 1, in which the core is a ring or pipe of flexible material, on the outside of which the strips of flexible material run.

3. Container according to Claim 2, in which a plane at right angles to and inside the side walls of the container is divided into five regions with approximately the same surface areas by the core and the strips.

4. Container according to Claim 2 or 3, in which the strips and the core are of the same length in the vertical direction, and do not extend to the top edge and the bottom edge of the side walls.

5. Container according to Claim 2, 3 or 4, in which the filling opening is situated directly above the core, in such a way that when the container is being filled the bulk material initially collects in the core, said bulk material pressing the flexible material of the core radially outwards and pulling it taut to a cylindrical shape.

6. Container according to Claim 5, in which the horizontal measurement of the strips is approximately the same as the distance of the cylindrical wall filled with bulk material from the side walls of the container.

7. Container according to any of the preceding claims, in which the side walls are provided with suspension lugs near each top corner of the container, and the core is fixed to the side walls near the suspension lugs by means of pull tapes or cords, in such a way that when the container is suspended the core is held open by said pull tapes or cords.

8. Container according to any of the preceding claims, in

which the side walls each comprise two halves connected to each other by a seam, in which seam a strip is also fixed.

9. Container according to Claim 8, in which the halves of every two adjacent side walls form a whole.

10. Container according to Claim 8 or 9, in which the vertical edges of two wall halves belonging together in each case first run outwards, enclosing the vertical edge of the corresponding strip, then run folded away from each other through 180° back to the outside of the side wall and, finally, run folded away from each other through 90°, while a cord is sewn into the seam parts running outwards relative to the side wall.

11. Container according to Claim 8, 9 or 10, in which a lining of liquid-tight material is provided, which lining has a slit or cut at the level of each strip, each strip projects outwards relative to the lining through the slit or cut, and the lining edges situated on either side of the strip in each case are fastened together in a liquid-tight manner by means of an essentially L-shaped adhesive tape.

12. Container according to Claim 11, in which an L-shaped adhesive tape is in each case fixed at one side to the outward projecting edge of the strip and at the other side to the outside of the lining edge in question.

13. Container according to Claim 11 or 12, in which a cord is in each case sewn into a packet comprising a first adhesive tape, a first side wall half, a strip, a second side wall half, and a second adhesive tape.

14. Container according to Claim 11 or 12, in which a cord is in each case sewn into a packet comprising a first side wall half, a strip and a second side wall half.

15. Method for producing stabilisation means for a container according to any of the preceding claims, in which the strips and the core are made of a self-contained length of flexible material, which length is formed by a square ring or pipe, of which two walls are then folded inwards over the central generating line, in such a way that the two central generating lines concerned come to lie near each other, and a packet is obtained with the following lying on each other in succession: an unfolded side wall, two inward folded halves of an adjacent side wall and, finally, an unfolded side wall, after which the unfolded side walls are fastened each at a distance

from their corner edge according to a generating line to the adjacent half of an inward folded side wall, in such a way that a strip is formed in each case between a corner edge and a fixing line, and the wall parts lying between the fixing lines form the core.

fig-1

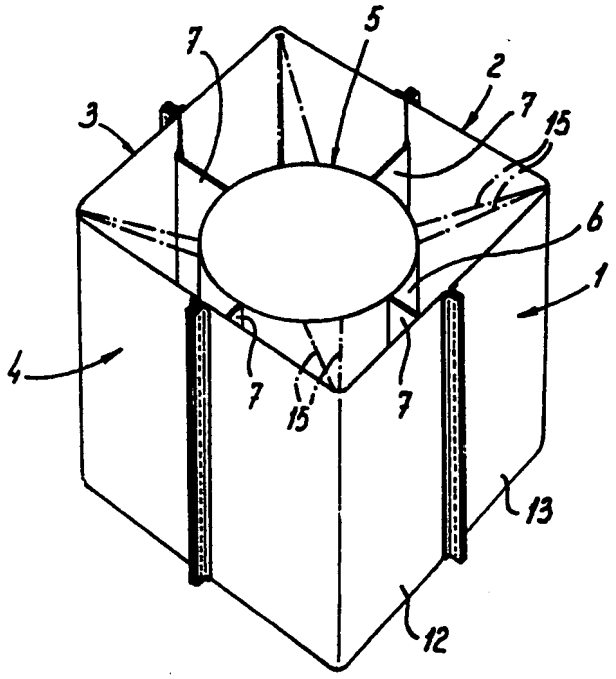


fig-2

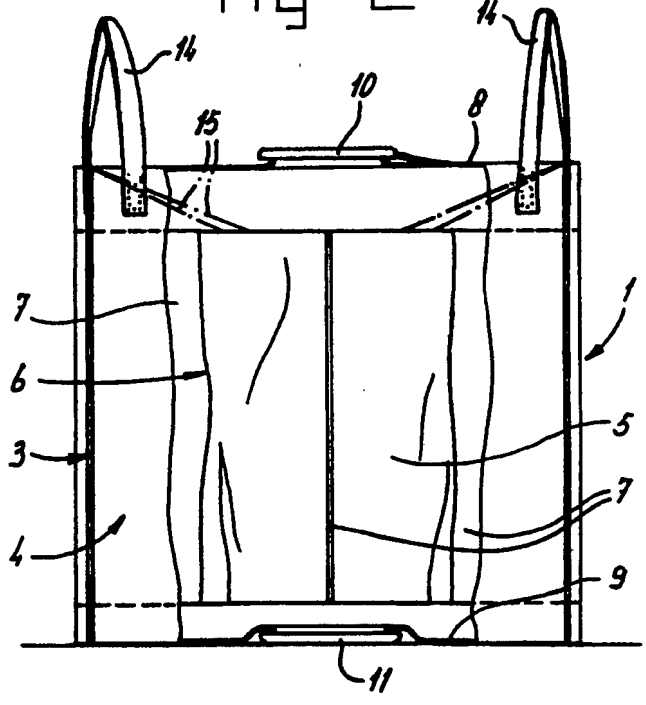
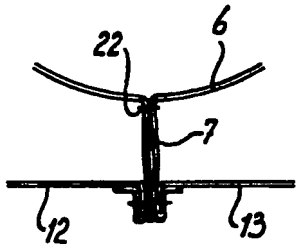


fig-3



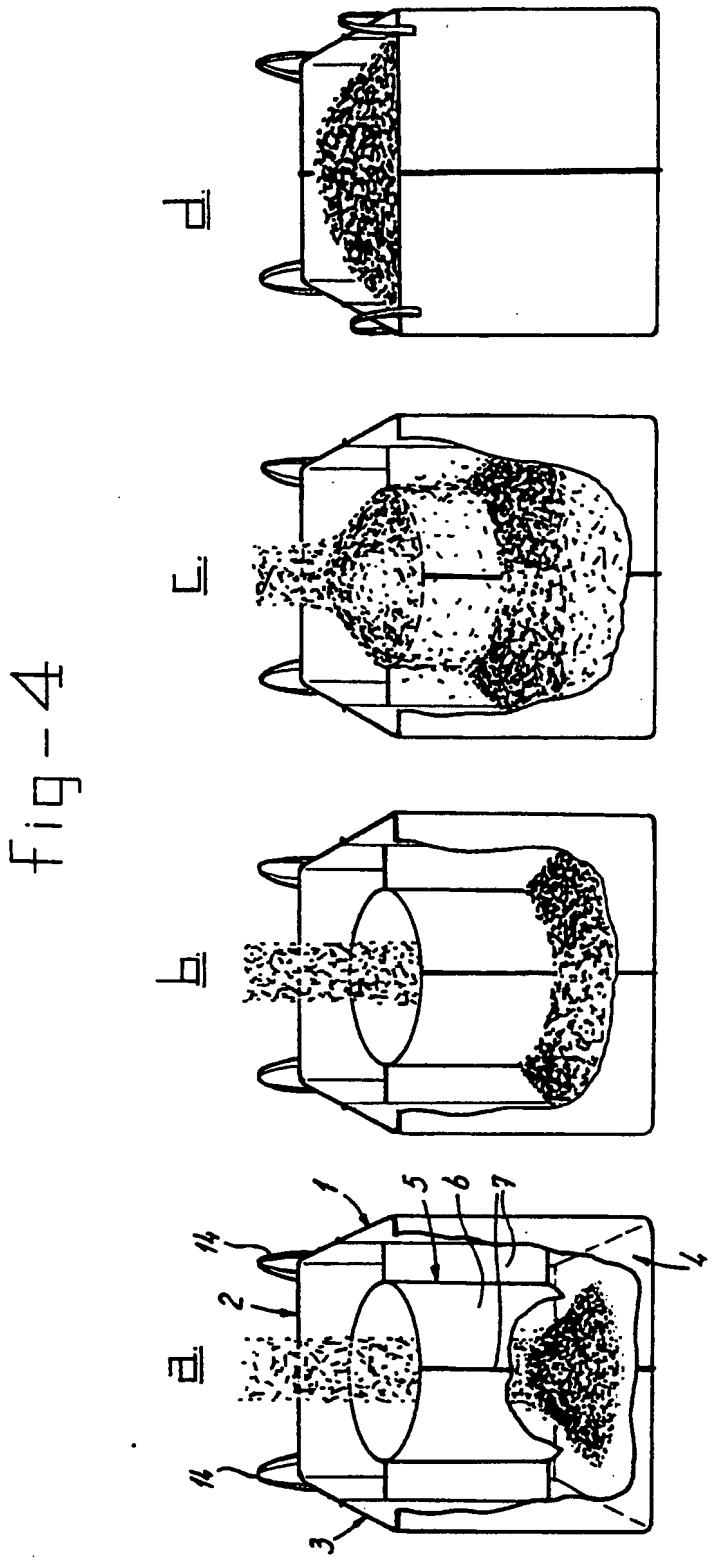


fig-4

Fig-5

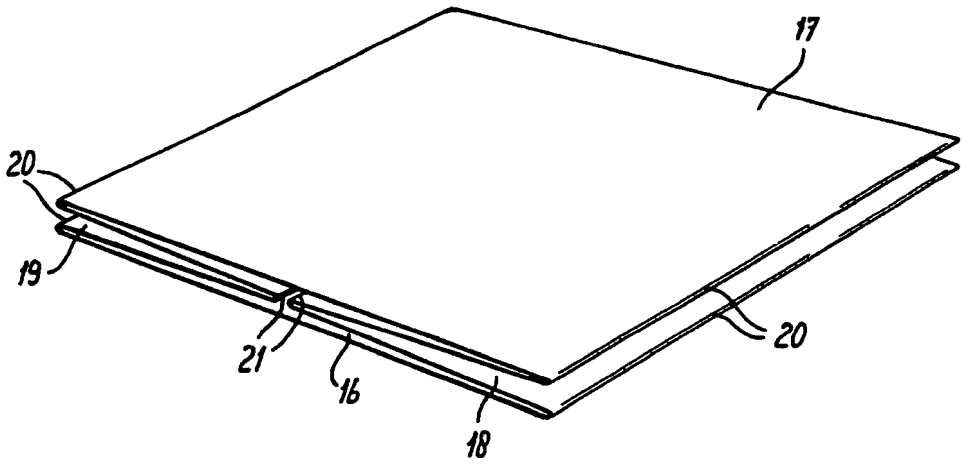


Fig-6

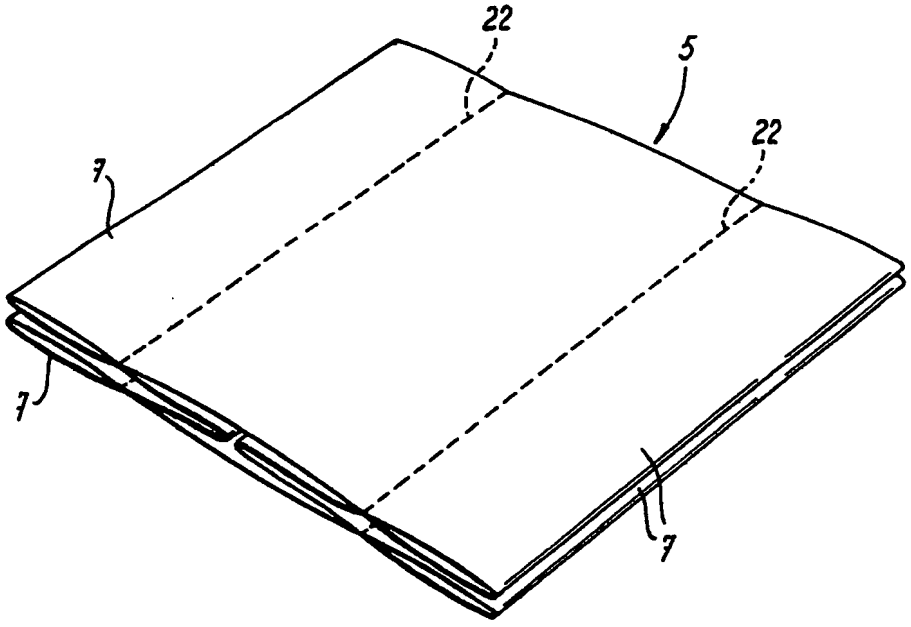


Fig-7

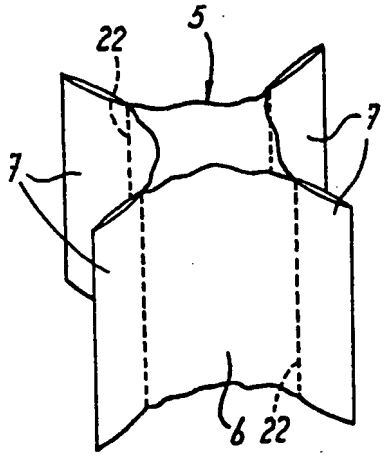


Fig-8

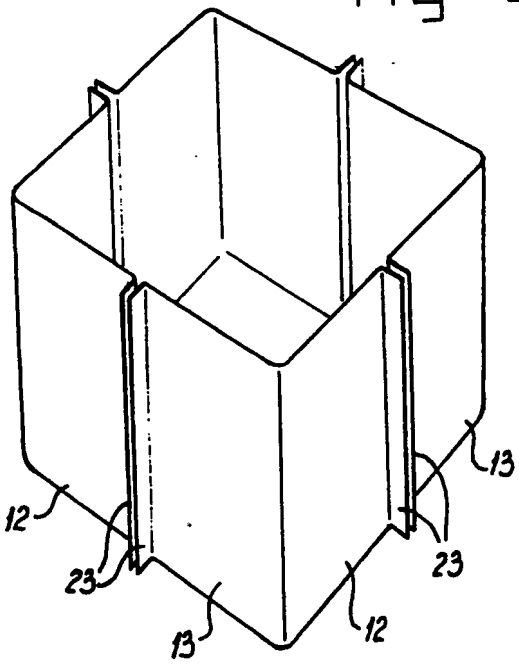


Fig-9

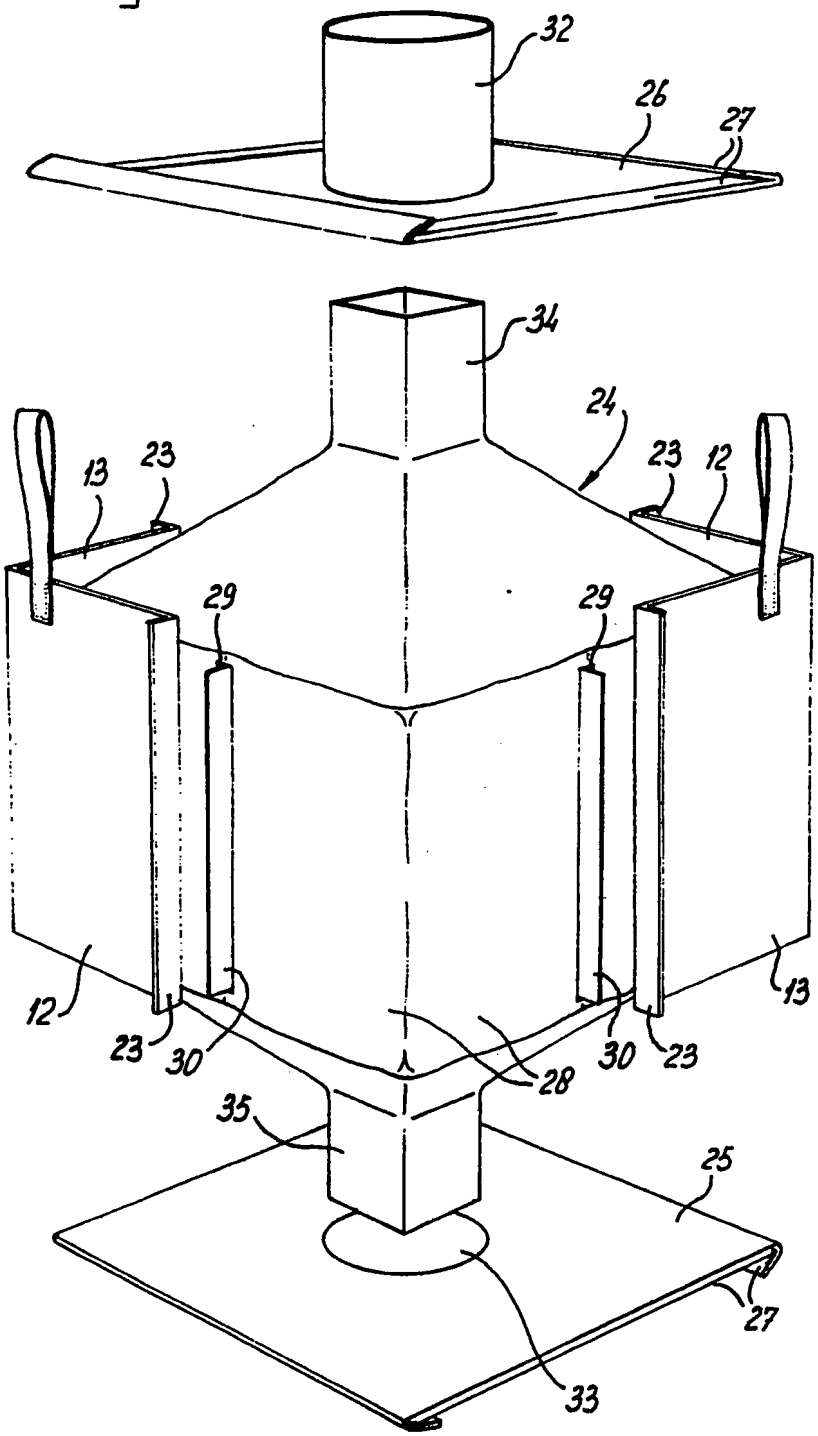
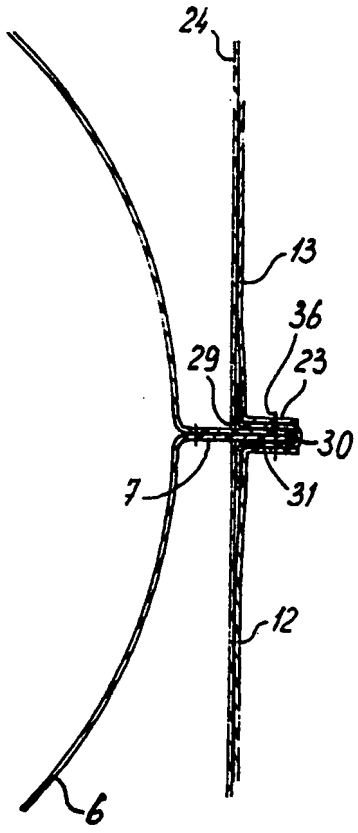


Fig-10



INTERNATIONAL SEARCH REPORT

International Application No PCT/NL 92/00037

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 B65D88/16

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	B65D

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No.[13]
X	FR,A,1 530 621 (COMP. INDUSTRIELLE DE NEUVILLE) 28 June 1968	1,2,4
A	see page 1, column 2, line 10 - page 2, column 1, line 23; figures 1,2	3,5
X	GB,A,1 544 631 (FISONS LIM.) 25 April 1979	1,2
A	see the whole document	3
A	CH,A,362 980 (ETABL. POLIET ET CHAUSSON) 15 August 1962 see page 2, line 74 - line 99; figures 1-3	1,2,6
A	US,A,3 949 901 (SHINKO TOKITA) 13 April 1976 see column 2, line 62 - column 3, line 24; figures 2-4	1,2,4
A	EP,A,0 372 153 (HABERL GMBH) 13 June 1990 see column 2, line 26 - column 3, line 11; figures 2,4,5	8,9,15

-/—

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
27 MAY 1992	24. 06. 92
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	VAN ROLLEGHEM F.

Form PCT/ISA/210 (second sheet) (January 1985)

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	EP,A,0 168 974 (NATTRASS-HICKEY AND SONS LIM.) 22 January 1986 see page 1, line 5 - line 11 see claims 1-6; figures	11,12

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. NL 9200037 SA 57442

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 27/05/92
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Patent document cited in search report	Publication date	Patent family member(s)		Publication date
FR-A-1530621		None		
GB-A-1544631	25-04-79	None		
CH-A-362980		None		
US-A-3949901	13-04-76	None		
EP-A-0372153	13-06-90	None		
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		US-A-	4597102	24-06-86